

REMARKS

In response to the Final Rejection dated 11 May 2001, claims 1 and 5 have been amended. The amendments made to claims 1 and 5 were made to improve matters of form and style. The amendments have not altered the scope of the claims. No new matter has been added. Reexamination and reconsideration of the claims is respectfully requested.

The Applicant submits that the claims as they presently stand are substantially identical to the claims examined for the Final Office action dated 11 May 2000. Entry of this amendment will not require the Examiner to perform any additional searching in view of the amendments made herein. The Applicant believes that the arguments made below clearly distinguish the instant invention from the reference cited by the Examiner in the Office Action.

In order for an invention to be anticipated by a prior art reference, each and every claimed element must be found in the prior art reference. At least one element of the instant invention has been identified by the Applicant that is neither taught, disclosed nor suggested by the prior art reference. For at least these reasons, the Applicant respectfully submits the instant amendment should in fact be entered and given full consideration. Entry of this amendment is earnestly solicited.

In paragraph 2 on page 2 of the Office Action, claim 1 was rejected under 35 U.S.C. § 112 second paragraph for lacking antecedent basis. The Applicant respectfully traverses this rejection, but have amended the claim to overcome the rejection.

Claim 1 recites a method for determining the position of a mobile station in line 1. Claim 1 then recites said location information in lines 2 and 3 of the claim. The Applicant



believes that the position of an object and the location information of an object are synonymous terms, thus the position of an object provides antecedent basis for the location information of an object.

However to advance prosecution, claim 1 has been amended to overcome the rejection under 35 U.S.C. § 112 second paragraph for lacking antecedent basis. It is believed that all claims comply with 35 U.S.C. § 112.

In paragraph 4 on page 2 of the Office Action, claims 1-3 and 5-8 stand rejected under 35 U.S.C. §102 (b) as being anticipated by Tayloe (EP0431956A2). The Applicant respectfully traverses this rejection, but have amended the application to address the Examiner's rejections, and to facilitate prosecution of the application.

According to the Office Action, Tayloe et al., European Patent Application EP0431956A2, discloses the invention substantially as claimed. The Applicant respectfully disagrees as described more fully below.

The Applicant's instant invention, as recited in claims 1 and 5, teaches that a single base station can receive signals of varying levels from a single mobile station via different antenna beams. The single base station includes equipment for receiving signals from the single mobile station simultaneously by at least two antenna beams directed in different directions outwardly from the single base station as recited in claims 1 and 5 and depicted in Figures 2 and 3 of the instant application. The instant invention as claimed is a base station that determines the position of a mobile station in its coverage area without the assistance of any additional base stations as required by the cited prior art. Claim 1 further discloses that the base station determines the position of the mobile station by comparing the signal levels being simultaneously received at the base station by the



different antenna beams directed in the different directions by the same base station. The above recited features are disclosed in either claim 1, claim 5 or both claims 1 and 5 of the instant application, but fail to be taught, suggested, or otherwise disclosed in the cited prior art reference Tayloe.

Tayloe et al., in contrast, teaches a radio-telephone system that necessarily requires multiple base stations working in conjunction with each other to determine the position of a mobile unit. In Tayloe et al., Figure 1, three base stations are disclosed wherein each station receives signals from the mobile unit and determines the position of the unit by the well known triangulation method.

Nowhere in Tayloe is it taught that a single base station is capable of determining the position of a mobile unit by comparing multiple signal levels simultaneously received at the base station via different antenna beams of the same base station. Further, Tayloe does not teach, disclose, or suggest a base station having equipment capable of simultaneously receiving at least two signals from a single mobile unit from two differently directed antenna beams originating from the same single base station. For these reasons, it is respectfully that Tayloe does not anticipate the instant invention as claimed.

For the reasons cited above the Applicant submits that claims 1 and 5 are allowable over the prior art of record.

Dependent claims 2-4 and 6-8, which are dependent from independent claims 1 and 5, were also rejected under 35 USC § 102(e) as being unpatentable over Tayloe. While the Applicant does not acquiesce with particular rejections to these dependent claims, it is believed that these rejections are now moot in view of the remarks made in connection with independent claims 1 and 5. These dependent claims include all the



limitations of the base claims and intervening claims, and recite additional features which further distinguish these claims from the cited references. Therefore, dependent claims 2-4 and 6-8 are also in condition for allowance.

In paragraph 5 on page 4 of the Office Action, claim 4 is indicated as containing allowable subject matter if written in independent form and including all the limitations of the independent base claim. The Applicant thanks the Examiner for this indication.



CONCLUSION

In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. The amendments clarify the patentable invention without adding new subject matter. The Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

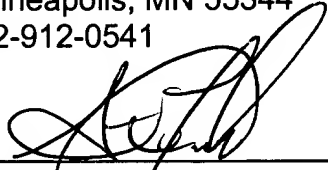
If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Steven R. Funk at 952-912-0541

Respectfully submitted,

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Appendix A
Marked Up Version of the Amended Claims

1 1. (Twice Amended) A method for determining the position of a mobile
2 station located in a coverage area of a base station in a radio system and for using
3 [said] location information, in which method the base station comprises equipment for
4 receiving signals from the same mobile station simultaneously by at least two antenna
5 beams directed in different directions, the method comprising:
6 measuring signal levels of signals received from a same mobile station by
7 different antenna beams of said base station,
8 comparing the signal levels of the signals received from the same mobile station
9 by the different antenna beams,
10 determining a direction to the mobile station in relation to the base station on the
11 basis of a relations between the signal levels measured for the different antenna beams,
12 and
13 calculating a distance from the mobile station to the base station on the basis of
14 a timing advance, given to the mobile station by the base station and propagation speed
15 of the radio signals, wherein said distance and said direction is used for making a
16 decision whether or not said mobile station should be transferred to another base
17 station by a handover.

1 2. (Unchanged) A method according to claim 1, wherein calculating a mean
2 value for the measuring results during a determined time period and determining the
3 direction to the mobile station on the basis of the relations between the calculated mean
4 values.



1 3. (Unchanged) A method according to claim 1, wherein choosing a beam
2 by which signals with the strongest signal level have been received and at least one of
3 the adjacent beams (D), comparing the measured signal levels for the antenna beams,
4 and determining the direction to the mobile station on the basis of the relation between
5 the signal levels for the chosen antenna beams.

1 4. (Unchanged) A method according to claim 1, wherein determining that the
2 mobile station is located

3 - in the center of the first chosen beam, if signal level (RSSI1) of the signals
4 received by the beam is essentially higher than a signal level (RSSI2) of the signals
5 received by the other chosen antenna beam,

6 - in a border area between the antenna beams, if the signal level (RSSI1, RSSI2)
7 of the signals received by the chosen antenna beams are substantially the same, and

8 - between the center of the first chosen antenna beam and the border zone of the
9 beams, if the signal level (RSSI1) of the signals received by the first antenna beam is
10 somewhat higher than the signal level (RSSI2) of the signals received by the other
11 antenna beam.



1 5. (Twice Amended) Base station (BTS1) of a radio system, which base
2 station comprises:
3 antenna equipment for receiving signals from a certain mobile station
4 simultaneously by at least two antenna beams directed in different directions,
5 measuring equipment for measuring the signal levels of the signals received by
6 the different antenna beams,
7 equipment for defining a timing advance for the mobile station which is in radio
8 connection with the base station to compensate for a time lag caused by the distance
9 between the mobile station and the base station, and
10 calculation means which are responsive to the measuring equipment for
11 determining the direction from the base station to the mobile station on the basis of the
12 relations of the signal levels measured for the different antenna beams, and which
13 calculation [calculating] means comprise equipment for calculating the distance
14 between distance between the base station and the mobile station on the basis of the
15 timing advance defined for the mobile station and the propagation speed of the radio
16 signals,
17 wherein said calculation means are adapted to transmit said direction and said
18 distance further in the system in order to be used for making a decision whether or not
19 said mobile station should be transferred to another base station by a handover.



1 6. (Unchanged) Base station according to claim 5, wherein that the
2 calculation means are arranged for calculating for each beam the mean value of the
3 signal levels of the signals received from the mobile station by the respective antenna
4 beams, whereby the calculation means are arranged to determine the direction from
5 the base station to the mobile station on the basis of relations between the calculated
6 mean values.

1 7. (Unchanged) Base station according to claim 5, wherein that the
2 calculation means include means for choosing the antenna beam (1) with the
3 strongest signal level and at least one adjacent beam (2), wherein the calculating
4 means are arranged for determining the direction from the base station to the mobile
5 station on the basis of the relations of the signal levels (RSSI1, RSSI2) of the signals
6 received via the chosen antenna beams (1, 2).

1 8. (Unchanged) Base station according to claim 5, wherein said base station
2 is a base station of a cellular radio system divided into logical traffic channels in
3 accordance with a TDMA principle.

